Remarks

Reconsideration of this application in light of the above amendments and the following remarks is requested.

Original claims 1, 8, 11, 12, 13, 15, and 16 have been amended and the remaining original claims have been maintained in the application. The original claims were rejected under 35 U.S.C. §102(b) as being anticipated by Montgomery (U.S. Patent No. 5,775,803). This rejection is traversed in light of the amended claims for the following reasons.

Amended claim 1 recites a method of forming a mixture from two elements at least one of which is a liquid, comprising the steps of introducing a first element into a vessel at a volumetric flow rate; introducing a second element into the vessel at a volumetric flow rate to cause the two elements to mix and form a mixture in the vessel; discharging the mixture from the vessel; controlling the volumetric flow rate of one of the two elements to maintain a constant level of the mixture in the vessel; and controlling the volumetric flow rate of the other of the two elements to maintain a predetermined ratio of the volumetric flow rate of the other element and the volumetric flow rate of the mixture discharged from the vessel.

Thus, as well described in paragraphs 5 and 6 of the instant specification, the materials are mixed to a predetermined volumetric proportion. The input, measurements, and control functions involve volumes and volume ratios only. A constant level (volume) of mixture in the mixing is maintained in the vessel no matter what the initial level is (the initial level can vary from application to application). The reason for this is that, for the volumetric proportions of the materials being added to the mixture in the vessel to be correct, the vessel level (volume) must be constant. If the vessel level (volume) is allowed to change during a mixing operation (as in the Montgomery method), the above proportions would not be correct.

The PTO provides in MPEP §1331 that:

> "[t]o anticipate a claim, the reference must teach every element of the claim...."

Therefore, to support the above rejection with respect to amended claim 1, the Montgomery patent must contain all of the above claimed elements of the claim. However, as will be made clear in the discussion below, this patent does not disclose controlling the volumetric flow rate of one of the two elements to maintain a constant level of the mixture in the vessel; and controlling the volumetric flow rate of the other of the two elements to maintain a predetermined ratio of the volumetric flow rate of the other element and the volumetric flow rate of the mixture discharged from the vessel. Rather, the Montgomery uses density information to determine ratios, then uses the ratios to mix slurries to predetermined densities. The purpose of the Montgomery technique is to ensure a desired ratio of water and cement in the slurry by

determining, controlling, and adjusting the ration by density information to obtain a desired density of slurry.

Prior to Montgomery's automatic operation, a cement batch with the correct density must be made up (see the Montgomery patent, Col. 10, line 25). The desired slurry density, mix water density, and absolute density of the dry cement are determined and entered into the controller (Col. 3, line 50, Col. 4, line 45). The density of the slurry is measured with a sensor or other method, and the level of mix in the mixing vessel is maintained at a fixed set-point level. If the vessel level varies up or down, either due to the rate changes or system variations, the level is returned to the set point, at which it is maintained (see Col. 10, lines 30-38). Thus, the level could change 4-8 inches or more during a rate change or blend change, and, during the transition back to the set point, the volumetric proportions would not be correct.

Thus, Montgomery is limited to a method and system for controlling density of a slurry in which the actual slurry density is measured without knowing beforehand the material and slurry densities. Inasmuch as the method taught by Montgomery requires density information to function, it does not teach a system or method for mixing materials, particularly cement slurries, by volume ratios alone, as defined in amended claim 1 of the instant application.

Moreover, Montgomery's sole involvement with density, either theoretical or measured, in the mixing control process as a control parameter could lead to improperly mixed slurries because the volume ratios of the components might not be property controlled. In particular the Montgomery method relies on density information input by the operator to calculate what the material ratios should be (Col. 3, line 66 – Col. 4, line 25, Col. 10, lines 43-52, Col. 13, line 57-Col. 14, line 13). Alternatively, material ratios are measured while mixing at a specified density to determine what the ratios should be (Col. 11, line 42-Col. 12, line 23, Col. 14, line 55-Col. 15, line 20). Either way, the Montgomery disclosure relies on density information to calculate (or determine) volumetric ratios for the purpose of producing slurry with a specified density.

Also, there are situations in which the Montgomery technique will not work because the relationship between density and volumetric proportions is lost. For slurries which the density is not similar to the mix water density, and for which the material densities are greatly different, Montgomery and other density-based mixing systems will work. However, as the densities become closer in value, the Montgomery technique, will become increasingly inaccurate. Ultimately, the system ceases to provide any control over the volumetric proportions of the materials.

In the Montgomery method, if the slurry density is the same as the mix water density, the ratios cannot be calculated from material and slurry density. The startup cannot be

accomplished by initially filling the vessel with slurry of the proper density as required in the Montgomery method (Col. 10, line 25) because density has no relationship to volumetric proportions. Since all materials are of the same density, the resulting slurry will be of the same density regardless of the proportions in which the materials are mixed. Adjustments to the system cannot be made based on density measurements. According to the Montgomery method a slurry of this type cannot be mixed because of the reliance on density for system control. The equation presented by Montgomery for calculating % water (see Col. 10, line 45) would result in a "divide by zero" error. Neither can Montgomery determine the ratio using system measurements. Thus, Montgomery provides no method or system for controlling the mixing process under these circumstances.

There are other situations in which the method and system taught by Montgomery may function, but the material proportions (ratios) as needed to maintain slurry properties other than density would not be controlled. As stated above, as the densities become increasingly closer to one another, rounding errors and inaccuracies in input data, as well as density measurement errors, have an increasingly greater effect, causing increasing error in the calculated ratios to the point that the error in the ratio determined by Montgomery could be significant. Also, as the material densities become increasingly closer to one another, the slurry density becomes more independent of the ratios and more dependent on material densities alone. This could result in four problematic situations for Montgomery and other density-based systems and methods.

1. The slurry could be mixed at the right density but, unknowingly, of the wrong material proportions. There are many important slurry properties dependent on material proportions that would be adversely affected in such situations. A few of these properties are fluid loss, thickening time, viscosity, strength, and transition time.

2. Density could be adjusted by adjusting material ratios, but this could be futile since it could result in slurry so thick as to be unmixable or so thin as to be useless, yet the density changes would not be accomplished by the system.

3. If material proportions were initially correct but density slightly off, in an effort to maintain extremely accurate density, fine adjustments in density could be made that would adversely affect the volumetric proportions of materials, yet still provide a mixable slurry, unknowingly resulting in a slurry of undesirable properties.

4. Errors in density measurement could cause system adjustments that would adversely affect material volumetric ratios.

Therefore, the Montgomery system and method is easily distinguished from the method of claim 1 of the present invention in which a predetermined volumetric ratio of the mix water

input and slurry discharge is maintained for the purpose of controlling the volumetric solid-to-water ratio in the slurry. This information comes from the cement slurry design laboratory and is input into the system controller by the operator. Thus, the present method avoids the above problems of the Montgomery method by mixing to predetermined volumetric proportions (ratios), while departing from any use of density in the mixing process, measurement, or control. Thus, according to the method of claim 1 the mixed slurries are of the same density as the mix water (i.e., all materials are of the same density).

It is therefore submitted that claim 1 clearly and precisely distinguishes over the Montgomery reference and is allowable over this references and the remaining references of record.

Amended independent claims 8 and 16 each contain the above limitations of claim 1 in a system format and, for the reasons indicated above, are in condition for allowance. Dependent claims 2-7, 9-15, and 17-19 further limit independent claims 1, 8 and 16, respectively in a patentable sense and for this reason and the reasons set forth above, are also deemed to be in condition for allowance

In view of the forgoing, and early formal notice of allowance is respectfully requested.

Respectfully submitted,

Warren B. Kice
Registration No. 22,732

Date: 1/8/4

HAYNES AND BOONE, LLP
901 Main Street, Suite 3100
Dallas, Texas 75202-3789
Telephone: 214-651-5634
Facsimile: 214 200-0853
File: 30545.39

EXPRESS MAIL NO.: EV 333439946 US
DATE OF DEPOSIT: January 8, 2004
This paper and fee are being deposited with the U.S. Postal Service Express Mail Post Office to Addressee service under 37 CFR §1.10 on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450
SANDRA KUBIN
Name of person mailing paper and fee
Sandra Kubin
Signature of person mailing paper and fee